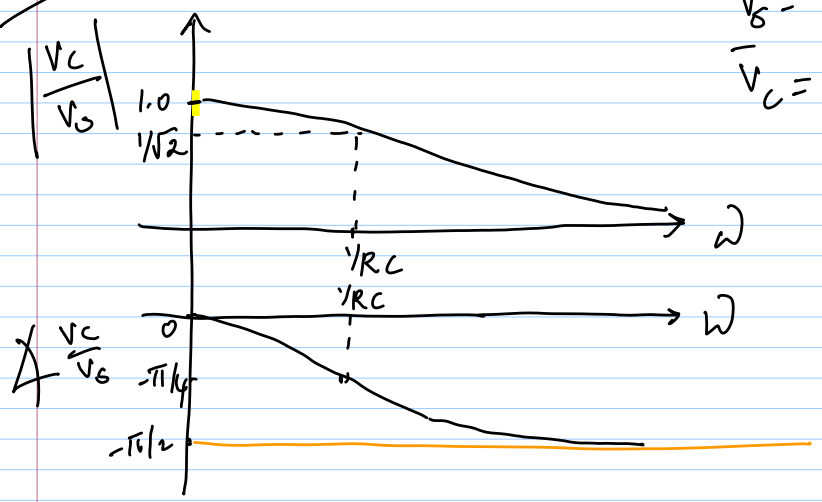
30/3/15

Lec 32



$\bar{V}_s = V_p \angle 0$

$\bar{V}_c = \frac{1}{1+j\omega CR} \cdot \bar{V}_s$

Logarithmic Scale

$\frac{\bar{V}_c}{\bar{V}_s} = \frac{1}{1+j\omega CR}$

$\log_{10}\left|\frac{\bar{V}_c}{\bar{V}_s}\right| = \log_{10}\left|\frac{1}{\sqrt{1+\omega^2C^2R^2}}\right|$

$\left|\frac{\bar{V}_c}{\bar{V}_s}\right| = \frac{1}{\sqrt{1+\omega^2C^2R^2}}$

linear

		$\log_{10}$	dB
$\omega \ll \frac{1}{RC}$	$\|\ \| = 1$	0	0
$\omega = 1/RC$	$\|\ \| = 1/\sqrt{2}$	−0.15	−3 dB
$\omega \gg 1/RC$	$\|\ \| = \frac{1}{\omega CR}$	$-\log_{10}(\omega CR)$	$-20\log_{10}(\omega CR)$

decibel (dB)$\Big|_{power} = 10\log_{10}(P)$

decibel (dB)$\Big|_{Voltage} = 20\log_{10}(V)$

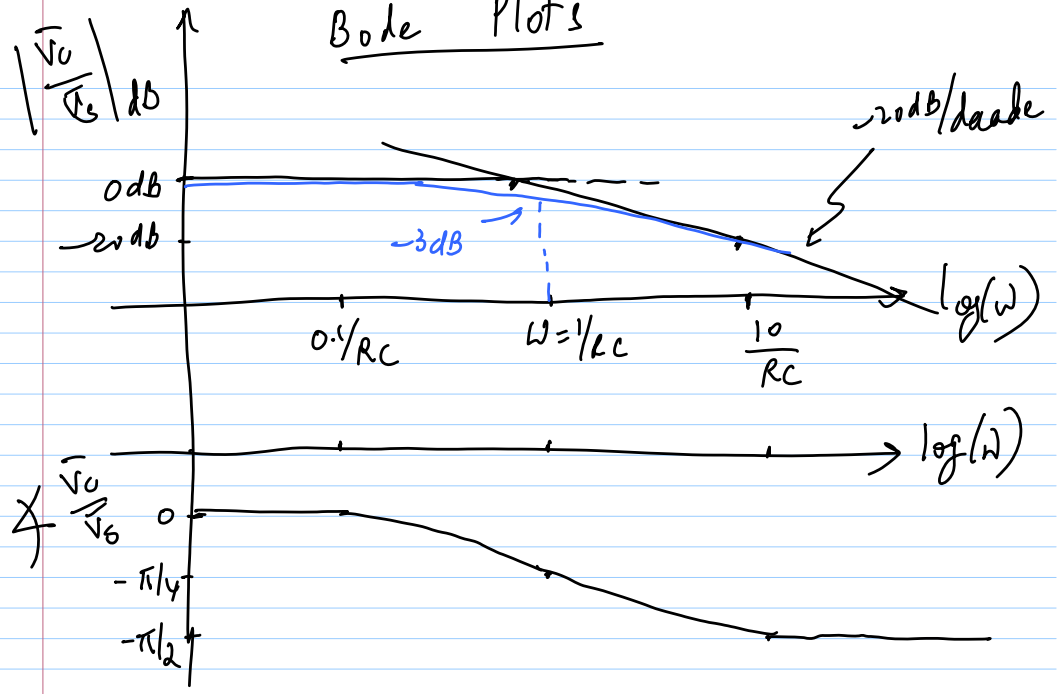
dB normally used for ratios of quantities

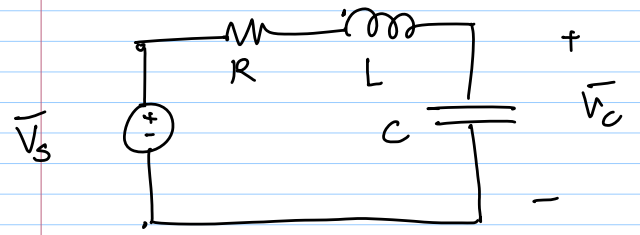
@ $\omega \gg 1/RC$

$20\log_{10}\left|\frac{\bar{V}_c}{\bar{V}_s}\right| = -20\log_{10}(\omega) - 20\log_{10}(RC)$

@ ω_1 : $-20\log(\omega_1) - 20\log_{10}(RC)$

Bode Plots





$$\frac{\bar{V}_C}{\bar{V}_S} = \frac{1/j\omega C}{R + j\omega L + 1/j\omega C} = \frac{1}{(1 - \omega^2 LC) + j\omega CR}$$